Trends in Parasitology | Vector of the Month

Glossina palpalis gambiensis (Tsetse Fly)

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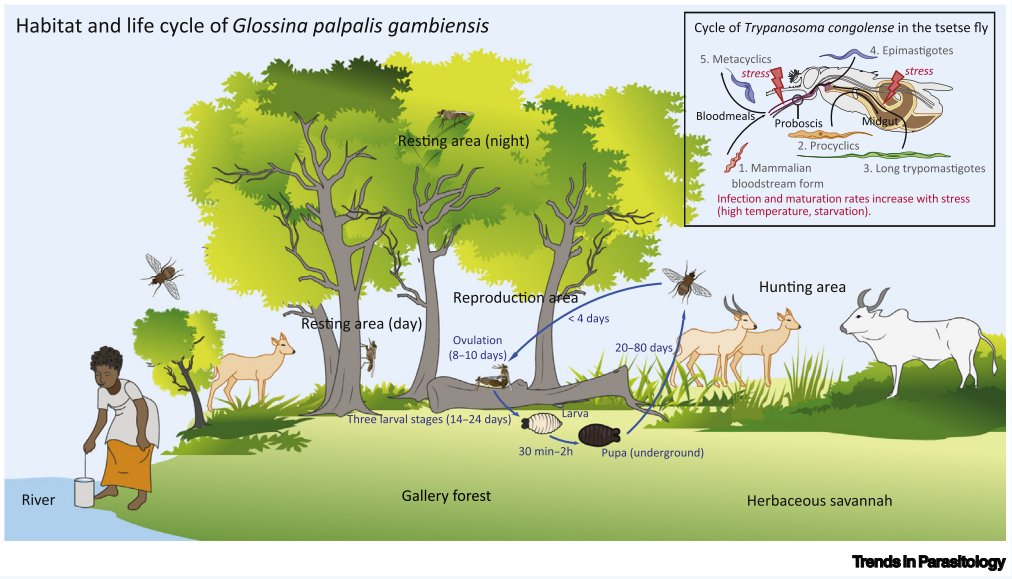
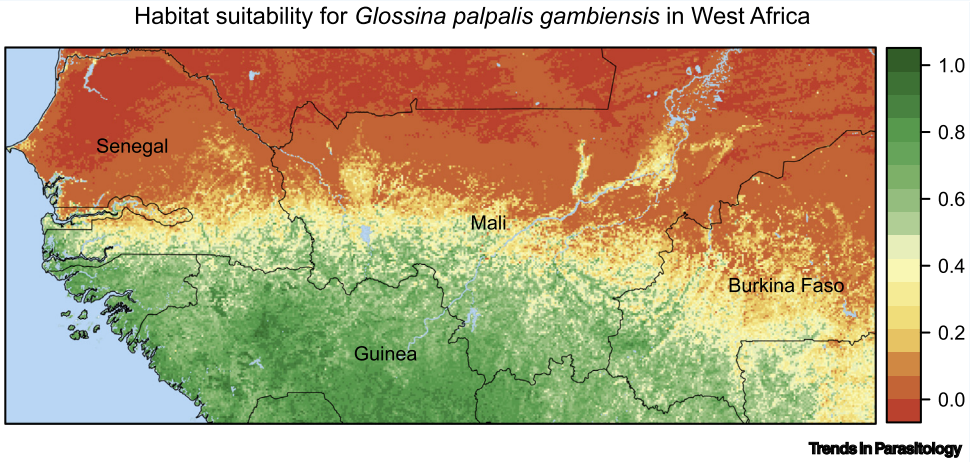


Glossina palpalis gambiensis is a riverine tsetse species endemic in West Africa and thriving in riparian vegetation of the savannah areas from Burkina Faso and Mali to Guinea and Senegal. It is a major vector of human and animal trypanosomosis (sleeping sickness and nagana, respectively) in that region. *G. p. gambiensis* is an opportunistic species, feeding on a wide range of hosts from reptiles to pigs and cattle, with humans as one of its preferred hosts. Like most tsetse species, it has a narrow range of acceptable temperature and humidity, a low reproduction rate, and is thus very sensitive to climate change but can adapt to human modification of its environment and survive in polluted and densely populated areas. Its presence in the Niayes area of Senegal, where rainfall is below 500 mm a year, and in the Parc de Hahn of Dakar reveals an extraordinary plasticity. In the Niayes area it is presently targeted by an eradication program, including a sterile insect technique component.



TRANSMISSION FACTS:
G. p. gambiensis can transmit all *Trypanosoma* spp., particularly *Trypanosoma brucei gambiense* in humans and *Trypanosoma vivax* in cattle.

It picks up the bloodstream form of trypanosomes from a host and injects the metacyclic form into the skin of another host after an extrinsic cycle of 10–30 days depending on the parasite species.

It is a day-biter, with a peak of activity conditioned by temperature. Its distribution, density, lifespan and infection rate are also temperature-dependent.

Its learning capability increases the hunting efficiency of older flies, that is, the host selected for the first bloodmeal can influence host selection for the second meal.

CONTROL FACTS:
Conventional control relies on insecticide-baited traps. Cattle are generally treated with pyrethroid pour-ons.

In Guinea, its control was instrumental in reducing the incidence of sleeping sickness.

Its ecology and preferred habitats (riverine and dense forest vegetation) partially protect it against sequential aerosol spraying of insecticides that is more efficient against savannah tsetse species.

It was eradicated from a 3000 km^2 area in Burkina Faso (Sidéradougou) in the 1980s using an integrated strategy including the sterile insect technique, but the cleared area was then reinvaded because the target area was not isolated.

TAXONOMY AND CLASSIFICATION
PHYLUM: Arthropoda
CLASS: Insecta
ORDER: Diptera
FAMILY: Glossinidae
GENUS: *Glossina*
SPECIES: *G. palpalis gambiensis* (Vanderplank 1949)

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Resources

www.fao.org/paat/resources/atlases/tsetse-and-aat/en/
https://books.openedition.org/irdeditions/10532?lang=fr
www.anipedia.org/resources/vectors-tsetse-flies/1109

Literature

1. Van den Bossche, P. *et al.* (2010) A changing environment and the epidemiology of tsetse-transmitted livestock trypanosomiasis. *Trends Parasitol.* 26, 236–243
2. Solano, P. *et al.* (2010) Cyclical vectors of trypanosomosis. In *Infectious and Parasitic Diseases of Livestock* (Lefèvre, P.-C. *et al*., eds), pp. 155–183, Éditions Lavoisier (Tec & Doc)
3. Bouyer, J. *et al.* (2007) Learning influences host choice in tsetse. *Biol. Lett.* 3, 113–116
4. Awuoche, E.O. *et al.* (2017) Molecular characterization of tsetse's proboscis and its response to *Trypanosoma congolense* infection. *PLoS Negl. Trop. Dis.* 11, e0006057
5. Diall, O. *et al.* (2017) Developing a progressive control pathway for African animal trypanosomosis. *Trends Parasitol.* 33, 499–509
6. Courtin, F. *et al.* (2015) Reducing human–tsetse contact significantly enhances the efficacy of sleeping sickness active screening campaigns: a promising result in the context of elimination. *PLoS Negl. Trop. Dis.* 9, e0003727
7. De Deken, R. and Bouyer, J. (2018) Can sequential aerosol technique be used against riverine tsetse? *PLoS Negl. Trop. Dis.* 12, e0006768
8. Cuisance, D. *et al.* (1984) Les lâchers de mâles irradiés dans la campagne de lutte intégrée contre les glossines dans la zone pastorale de Sidéradougou, Burkina Faso. *Rev. Elev. Méd. vét. Pays trop.* 37, 449–468 (in French)
9. Dicko, A.H. *et al.* (2014) Using species distribution models to optimize vector control: the tsetse eradication campaign in Senegal. *Proc. Natl. Acad. Sci. U. S. A.* 111, 10149–10154
10. Bouyer, J. *et al.* (2015) Mapping landscape friction to locate isolated tsetse populations candidate for elimination. *Proc. Natl. Acad. Sci. U. S. A.* 112, 14575–14580

  https://doi.org/10.1016/j.pt.2020.05.010